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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,324	08/27/2001	Robert T. George	2207/12003	5090

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KENYON & KENYON (SAN JOSE)
333 WEST SAN CARLOS ST.
SUITE 600
SAN JOSE, CA 95110

EXAMINER	
KIM, HONG CHONG	
ART UNIT	PAPER NUMBER
2186	6

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/940,324	GEORGE ET AL.	
	Examiner	Art Unit	
	Hong C Kim	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Detailed Action

1. Claims 1-17 are presented for examination. This office action is in response to the application filed on 8/27/01.

Information Disclosure Statement

2. Receipt is acknowledged of information disclosure statement filed on 3/8/03, which the statement has been placed of record in the file. Information disclosed and listed on PTO 1449 was considered.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Castle et al. (Castle) U.S. Patent 5,813,034.

As to claim 1 , Castle discloses the invention as claimed. Castle discloses a cache-coherent device comprising (Fig. 16): a plurality of client ports (Fig. 16 Ref. 80a and Ref. 62a), each to be coupled to one of a plurality of port components (Fig. 16 Refs. 90 and 95); a plurality

of sub-unit caches (Fig. 16 Ref. 91 and 96), each coupled to one of said plurality of client ports and assigned to one of said plurality of port components; and a coherency engine (Fig. 2A and Fig. 16 Ref. 101) coupled to said plurality of sub-unit caches.

As to claim 2, Castle discloses the invention as claimed in the above. Castle further discloses wherein said plurality of port components include processor port components (Fig. 16 PBUS).

As to claim 3, Castle discloses the invention as claimed in the above. Castle further discloses wherein said plurality of port components include input/output components (Fig. 16 Ref. SBUS).

As to claim 4, Castle discloses the invention as claimed in the above. Castle further discloses wherein said plurality of sub-unit caches include transaction buffers using a coherency logic protocol (Fig. 1 2A).

As to claim 5, Castle discloses the invention as claimed in the above. Castle further discloses wherein said coherency logic protocol includes a Modified-Exclusive-Shared-Invalid (MESI) cache coherency protocol (Fig 2A, TAG bits).

As to claim 6 , Castle discloses the invention as claimed. Castle discloses a cache-processing system comprising (Fig. 1) : a processor (Fig. 1 Ps); a plurality of port components (Fig. 14 Ref. 90 and 95; and a cache-coherent device (fig. 14 Ref. 101) coupled to said processor and including a plurality of client ports (Fig. 14 Ref. 55a and 52a), each coupled to one of said plurality of port components (Fig. 14 Ref. 90 and 95), said cache-coherent device further including a plurality of caches (Fig. 14 Ref. 91 and 96), each coupled to one of said plurality of client ports and assigned to one of said plurality of port components, and a coherency engine (Fig. 2A and Fig. 14 Ref. 101) coupled to said plurality of caches.

As to claim 7, Castle discloses the invention as claimed in the above. Castle further discloses wherein said plurality of port components include processor port components (Fig. 16 PBUS).

As to claim 8, Castle discloses the invention as claimed in the above. Castle further discloses wherein said plurality of port components include input/output components (Fig. 16 Ref. SBUS).

As to claim 9 , Castle discloses the invention as claimed. Castle discloses in a cache-coherent device (Fig. 14) including a coherency engine (Fig. 2A and Fig. 14 Ref. 101) and a plurality of client ports (Fig. 14 Ref 55a and 52a), a method for processing a transaction,

comprising: receiving a transaction request (col. 5 line 25 read command) at one of said plurality of client ports, said transaction request includes an address (col. 9 lines 20-25); and determining whether said address is present (col. 9 lines 20-25) in one of a plurality of sub-unit caches (Fig. 14 Ref. 91 and 96), each of said sub-unit caches assigned to said of a plurality of client ports (Fig. 14).

As to claim 10, Castle discloses the invention as claimed in the above. Castle further discloses wherein said transaction request is a read transaction request (col. 12 line 64).

As to claim 11, Castle discloses the invention as claimed in the above. Castle further discloses transmitting data for said read transaction request from said one of said plurality of sub-unit caches to one of said plurality of client ports (Fig. 14 52s, DATA).

As to claim 12, Castle discloses the invention as claimed in the above. Castle further discloses prefetching one or more cache lines ahead of said read transaction request (cache memory reads on this limitation since the cache memory is used to assure that the currently useful data of main memory are copied into the small and fast cache for the purpose of increasing data access speed by means of spacial and temporal localities); and updating the coherency state (Fig. 2A) information in said plurality of sub-unit caches.

As to claim 13, Castle discloses the invention as claimed in the above. Castle further discloses wherein the coherency state information includes a Modified-Exclusive-Shared-Invalid (MESI) cache coherency protocol (Fig. 2A, TAG bits).

As to claim 14, Castle discloses the invention as claimed in the above. Castle further discloses wherein said transaction request is a write transaction request (col. 7 line 31).

As to claim 15, Castle discloses the invention as claimed in the above. Castle further discloses modifying coherency state information for a cache line in said one of said plurality of sub-unit caches; updating coherency state information in others of said plurality of sub-unit caches by said coherency engine; and transmitting data for said write transaction request from said one of said plurality of sub-unit caches to memory (MESI protocol reads on this limitation and col. 7 thru col. 8).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Castle et al.

(Castle) U.S. Patent 5,813,034 in view of Witt et al. (Witt) U.S. Patent 6,202,139.

As to claim 16, Castle further discloses modifying coherency state information of said write transaction request (col. 7), however, Castle does not specifically disclose write transaction request in the order received and pipelining multiple write requests.

Witt discloses write transaction request in the order received and pipelining multiple write requests (col. 2 lines 42-43) for the purpose of avoiding bank conflicts thereby decreasing the performance losses and increasing the access speed (col. 2 lines 43-45).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate write transaction request in the order received and pipelining multiple write requests as shown in Witt into the invention of Castle because it would avoid bank conflicts thereby decreasing the performance losses and increasing the access speed.

As to claim 17, Castle and Witt disclose the invention as claimed in the above. Castle further discloses wherein the coherency state information includes a Modified-Exclusive-Shared-Invalid (MESI) cache coherency protocol (Fig. 2A).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See attached PTO-892.

8. a shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) days from the mail date of this letter. Failure to respond within the period for response will result in **ABANDONMENT** of the application (see 35 USC 133, MPEP 710.02, 710.02(b)).

9. When responding to the office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections. See 37 C.F.R. § 1.111(c).

10. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist examiner to locate the appropriate paragraphs.

11. . Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Hong Kim whose telephone number is (703) 305-3835. The Examiner can normally be reached on the weekdays from 8:30 AM to 5:00 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Matt Kim, can be reached on (703) 305-3821.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

12. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to TC-2100:
After-Final (703) 746-7238
Official (703) 746-7239 (for formal communications intended for entry)

Non-Official/Draft (703) 746-7240 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

HK
Primary Patent Examiner
June 11, 2003